REMARKS

Claims 1-6, all the claims pending in the application, stand rejected. Claims 5 and 6 are objected to. Claims 1 and 6 are amended. Claim 5 is cancelled.

Claim Objections

Claims 5 and 6 are objected to under 37 C.F.R. § 1.75(c) as being of improper dependent form. The Examiner notes that claim 5 is drawn to a method of manufacturing a glass substrate using the process method of parent claim 1.

As to claim 5, the objection is moot in view of the cancellation of the claim. Claim 6 has been amended to be consistent with the subject matter of claim 1.

Claim Rejection - 35 U.S.C. § 112

Claims 1-6 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. This rejection is traversed for at least the following reasons.

As to claim 1, the Examiner finds insufficient antecedent basis for the limitation "the smallest ion radius." This basis for rejection has been corrected.

For claim 4, the term "within a range" is objectionable because it is relative and undefined. The basis for this rejection has been corrected.

As to claim 5, the rejection is moot in view of the cancellation of the claim.

Claim 6 is rejected because of the recitation of a "glass substrate" without clearly identifying the intended substrate. This objection have been overcome by an amendment to the claim.

If the Examiner believes that further modification are necessary to place the claims in condition for allowance, the Examiner is requested to contact the undersigned in order to efficiently dispose of any outstanding issues.

Claim Rejections - 35 U.S.C. § 103

Claims 1-4 and 6 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Takahashi (6,119,483) in view of Aratani (4, 671,814). This rejection is traverses for at least the following reasons.

The present invention, as recited in the above-amended claim 1, comprises multiple stages. In a first-stage process, the glass substrate is chemically strengthened by the use of a first

alkali ion having a first ion radius greater than a smallest ion radius of a smallest alkali ion among the alkali ions contained in the glass substrate so as to produce (1) **compression stress** on a surface of the glass substrate and (2) **tensile stress** in a depth of the glass substrate.

In a second-stage process, the glass substrate is again chemically strengthened by the use of a second alkali ion having a second ion radius greater than the first ion radius of the first alkali ion so as to increase the **compression stress** of the surface of the glass substrate and to reduce the **tensile stress** of the depth of the glass substrate.

By such a specific two-stage process, it is possible to manufacture a glass substrate for a magnetic disk, which is high in transverse strength and is highly resistant to damage or breakage with time. These features are not found in the cited references (Takahashi and Aratani);

Takahashi

Takahashi discloses that a chemical strengthening process is carried out by dipping a glass substrate into a mixed molten salt containing sodium nitrate and potassium nitrate in order to manufacture a glass substrate for a magnetic disk. However, Takahashi is deficient for two basic reasons. Specifically, Takahashi fails to disclose (1) a two-stage process and (2) the specific features of the present invention in claim 1.

Aratani

Aratani does disclose a two-stage process. Specifically, Aratani discloses transferring from sodium nitrate to potassium nitrate in order to chemically strengthen a sheet glass (having a thickness of 1.0 mm). However, Aratani fails to disclose that the two-stage process is applied to a glass substrate for a magnetic disk. Furthermore, Aratani fails to disclose the specific features of the present invention as defined in claim 1.

Accordingly, Applicants submit that the cited references would not have been combined as alleged by the Examiner since they are directed to two different glass applications, sheet glass and glass substrates, each having very different size, strength and thickness requirements. Moreover, even if combined, the combination of the cited references would not teach or suggest the feature of the present invention as now recited in claim 1.

Information Disclosure Statement

Concurrent with the filing of the present amendment, Applicants are submitting an IDS that cites Japanese Unexamined Patent Publication No. 11-328601 (JP '601). This reference is distinguishable from the claimed invention and is not combinable with the cited art to preclude patentability for the following reasons.

JP '601 discloses a technique different from the present invention. According to the present invention, by the second stage of the two-stage process, the **compression stress** of the surface of the glass substrate is increased while the **tensile stress** of the depth of the glass substrate is reduced.

By contrast, in JP '601, the **tensile stress** of the depth of the glass substrate is also increased. In this regard, the present invention is fundamentally different from the JP '601.

Furthermore, in the present invention, the two-stage process is essential to achieving the desired result, a strong glass substrate. However, JP '601 teaches that in manufacturing a substrate, one may adopt either of the one-stage process and the two-stage process. The expected result is the same. Thus, the use of two sequential stages is not essential.

In this regard, the present invention is clearly different from JP '601. Specifically, the present invention can achieve a highly effective stress distribution having the above-mentioned feature only by adopting the two-stage process. By contrast, JP '601 achieves a less effective stress distribution, which is limited to an extent that can be similarly achieved by either of the one-stage process and the two-stage process.

In support thereof, Applicants respectfully refer the Examiner to Table 1 of the JP '601, Examples 1-12 correspond to the one-stage process and Examples 13-15 correspond to the two-stage process. As shown in Table 1, it is known that various stress distributions can be obtained depending upon processing methods even in the same one-stage process. The compressive stress distribution for the two stage process (700-780) is about the same as the compressive stress distribution for the one-stage process (720). However, even more significantly, the tensile stress distribution for the two stage process (160-180) is the same as the values at the lower end for the one stage process (150-180). Thus, the increase in compressive stress and the reduction in

tensile stress is not uniformly achieved with JP '601. This is in direct contrast to what is claimed.

The variations in stress values in JP '601 is due to variations in the processing methods, even in the same two-stage process, as is clear from the listed chemical strengthening conditions in Table 1. However, one skilled in the art would know that the extent to which there can be effective control by the one-stage process is inevitably restricted. One skilled in the art would also note from JP '601 that the intended stress distribution for the second stage of the process is about the same as for one stage process. That is, the stress distribution of JP '601 falls within the range capable of controlling even by the one-stage process (of course, the stress distribution can be controlled by the two-stage process). By contrast, the stress distribution of the present invention falls within an extended range available only by the claimed two-stage process. In this regard, the present invention is clearly different from JP '601.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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